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Students' Perceptions Of Learning Through Multiple Intelligences

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Students' Perceptions Of Learning Through Multiple Intelligences

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Abstract

The theory of multiple intelligences -- that individuals are smart in multiple ways-- is slowly being infused into the educational realm. A review of current literature indicates that the multiple intelligence theory is being incorporated into some schools. However, there is very little research at this time which identifies the results of incorporating multiple intelligences within education. The purpose of this research was to identify any change in students' perceptions of their intelligence strengths by teaching with the multiple intelligences in a thematic science and language arts unit. Three sixth grade students were chosen as case studies for the research. Data included field observation notes, interviews, journals, and student projects. The findings were mixed with two of the case studies showing increase in their perceptions of their intelligence strengths. The results from the third case student were inconclusive with no identifiable patterns discernable from the data. The findings suggest that incorporating multiple intelligence theory in education has possible positive implications and that further research needs to be done.

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Chapter 1

The Problem

Introduction

How we define intelligence makes a philosophical statement about what we value in education (Hoerr, 1992). Educators are becoming increasingly aware of the potential and impact of recognizing and valuing students' varied intelligences. Harvard University's Howard Gardner (1983) developed a theory that encourages a pluralized approach to understanding intelligence. Gardner identified seven ways in which individuals are intelligent. They are: linguistic, bodily-kinesthetic, mathematical/logical, spatial, musical, interpersonal, and intrapersonal.

Problem Statement

Very little research has documented the effects of implementing multiple intelligence (hereafter known as "MI") theory into the classroom. Howard Gardner (1983) developed the theory of multiple intelligences from his research on cognitive development, using a psychological perspective, not an educational one. Only recently has the education field picked up on Gardner's theory and its possibilities in the classroom. Educational research grounded in theory and practice based on MI is scarce, even though whole schools are operating thusly. This research investigated one aspect of MI use in the classroom--that of the effects of teaching. The implications of multiple intelligence theory for education have not yet been studied to any sizable extent.

Definition of Key Terms

Bodily/Kinesthetic Intelligence. Expertise in using one's whole body to express ideas and feeling (Armstrong, 1994).

Integration of curriculum. Combining learning in a continuous, meaningful way across subject matter (Five & Dionisio, 1996).

Intelligence. The capacity for solving problems and fashioning products in a context-rich and naturalistic setting (Gardner, 1983).

Interpersonal Intelligence. The ability to perceive and make distinctions in the moods, intentions, motivations, and feelings of other people (Armstrong, 1994).

Intrapersonal Intelligence. Self-knowledge and the ability to act adaptively on the basis of that knowledge (Armstrong, 1994).

Linguistic Intelligence. The capacity to use words effectively, whether orally or in writing (Armstrong, 1994).

Logical/Mathematical Intelligence. The capacity to use numbers effectively and to reason well (Armstrong, 1994).

Multiple Intelligences. Howard Gardner's theory that humans have many abilities based upon previously established criteria (Gardner, 1983).

Musical Intelligence. The capacity to perceive, discriminate, transform, and express musical forms (Armstrong, 1994).

Spatial Intelligence. The ability to perceive the visual-spatial world accurately and to perform transformations upon those perceptions (Armstrong, 1994).

Triangulation of Data. Multiple methods of data collection to understand phenomenon from various points of view and to identify themes or patterns (Maykut & Morehouse, 1994).

Purpose of the Study

This study was designed to describe some of the effects that teaching with a multiple intelligence emphasis in an integrated language arts and science unit had on students' perceptions of their intelligence strengths. Students interactions with their classmates after learning about MI theory was observed as well as whether or not their participation in class assignments and projects changed during the unit using MI.

This study was designed to also describe students own recognition of their own intelligences through a variety of activities and projects developed to incorporate multiple intelligences in an integrated thematic language arts and science unit. Furthermore, students identification of intelligences used in different activities was observed.

The study was conducted while integrating language arts and science through a thematic unit approach incorporating teaching styles and activities that target each of the intelligences. Using Gardner's theory of multiple intelligences, students' self-identified strengths were self-selected in each of the seven intelligences. Throughout the study, students were observed, interviewed, and assessed through surveys, portfolios and projects, in order to identify any change in strengths and perceptions of multiple intelligences.

The following research questions were addressed in the study:

What effect does teaching with a multiple intelligence emphasis in an integrated science and language arts unit have on students' intelligence strengths?

1) What are participants' strengths in each of the seven intelligences?

2) How do student responses about personal intelligence strengths on the post-survey differ from those of the pre-survey?

a) What patterns develop in their responses?

3) How does teaching about multiple intelligences to participants affect their awareness of their individual strengths in each area?

a) How do students respond to questions about which intelligence they used during activities?

c) How do students incorporate intelligences when asked to create a project using seven intelligences?

Delimitations

The study took place in the researcher's own classroom and included objective observations. The triangulation method of collecting data was used to limit potential bias. Data included surveys, field observation notes, interviews, and student documents.

A second delimitation was the length of the study. Due to the class context and length of one science unit, the study was conducted over a four-week period.

Finally, students were aware that they were involved in a research study, which may be reflected in the data.

Limitations

Limitations of the study include the natural maturation of students throughout the time of study. Outside influences often affect performance in school, thus individual intelligence preferences might have been affected by family and community events.

Summary

MI theory proposes that people use at least seven relatively autonomous intellectual capacities--each with its own distinctive mode of thinking--to approach problems and create products (Blythe & Gardner, 1990). Gardner (1993) maintains that in almost everybody, with the exception of brain-damaged individuals or savants, all the intelligences work together. This chapter presented an over- all view with definitions of key terms. The next chapter includes a review of literature.

Chapter 2

Review of Literature

Overview of Chapter

The purpose of the review of literature is to provide insight into the development of MI theory, as developed by Howard Gardner, and the criteria established to identify intelligences. Relatively little research has been done on the effects of implementing MI theory into the educational realm. However, the chapter identifies schools which are currently incorporating multiple intelligences into their curriculum. Finally, the chapter discusses the results of one educator's attempt at infusing the seven intelligences into his classroom.

Development of MI Theory

The idea of multiple intelligences developed as a result of a study done by Howard Gardner in response to a Dutch philanthropic group that wanted to investigate human potential. Initially, researchers looked at the development of symbolic skills in normal and gifted children, and the impairment of such skills in brain-damaged adults (Gardner, 1993). Gardner's (1993) research caused him to become dissatisfied with unitary models and measures of intelligence. The realization that individuals contained many faculties that worked autonomously, as well as together, led to the development of the theory of multiple intelligences.

In defining what intelligence is, Gardner states that it is the capacity for solving problems and fashioning products in a context-rich and naturalistic setting (Armstrong,

1994). In order to separate skills or talents from intelligence, Gardner developed a set of criteria in which to identify intelligences. The following are the eight criteria used to identify intelligences proposed by Gardner (1993) in his book Frames of Mind: The Theory of Multiple Intelligences.

Criteria #1: *Potential Isolation by Brain Damage.* To the extent that a particular faculty can be destroyed, or spared in isolation, as a result of brain damage, its relative autonomy from other human faculties seems likely.

Criteria #2: *The Existence of Idiots Savant, Prodigies, and Other Exceptional Individuals.* Individuals who exhibit a highly uneven profile of abilities and deficits are extremely precocious in one (or, more than one) area of human competence. At the same time, the selective absence of an intellectual skill provides a confirmation-by-negation of a certain intelligence.

Criteria #3: *An Identifiable Core Operation or Set of Operations.* The existence of one or more basic information-processing operations or mechanisms, which can deal with specific kinds of input...and is triggered by certain kinds of internally or externally presented information.

Criteria #4: *A Distinctive Developmental History, Along With a Definable Set of Expert "End-State" Performances.* An intelligence should have an identifiable developmental history through which individuals pass, and does not develop in isolation, except in an unusual person, and can also be identified by studying the "end-state" of a particular intelligence.

Criteria #5: *An Evolutionary History and Evolutionary Plausibility.* An intelligence must have its roots deeply imbedded in the evolution of human beings. It must be noted that the historical context of MI is subject to change over time as one (or more) intelligence becomes more important over the course of evolution.

Criteria #6: *Support From Experimental Psychological Tasks.* An intelligence can be witnessed working in isolation from other intelligences.

Criteria #7: *Support from Psychometric Findings.* Standardized measures of human ability provide the "test" that most theories of intelligence use to ascertain the validity of a model. Though Gardner is not an advocate of standardized tests, he points out that they are relevant to the extent that they purportedly assess one intelligence over another.

Criteria #8: *Susceptibility to Encoding In a Symbol System.* An intelligence must be able to be symbolized. Each intelligence, in fact, has its own unique symbol or notational system through which much of human representation and communication of knowledge takes place.

Gardner's intention when developing the eight criteria was to eliminate self-proclaimed intelligences. In order for an intelligence to be validated it has to be recognized and acknowledged by some population. Gardner claims that the products of an individual's efforts are always assessed within some field, that is, by individuals working within some domain who appraise the value of the work (Eisner, 1994).

Researchers have sought to observe development of these validated intelligences.

Several research projects are currently investigating the effects of using MI philosophy in different educational settings. Though no results have been documented, the success of each program looks promising.

Project Zero

Harvard Project Zero, founded by philosopher Nelson Goodman, is a research group at Harvard University's Graduate School of Education which has investigated the development of learning processes in children and adults for over 30 years (Gardner, 1993). Goodman challenged the widespread notion that linguistic and logical symbol systems had priority over other expressive and communicative systems (Gardner, 1989).

Project Zero's mission is to understand and enhance learning, thinking, and creativity in the arts and other disciplines for individuals and institutions (Project Zero Home Page, 1996). Starting in 1972, Howard Gardner and psychologist David Perkins have been co-directors of Project Zero. They have instituted a number of research projects, most notably Project Spectrum and ARTS PROPEL, that take into consideration alternative notions of intelligence.

Project Zero's original focus was on the developmental study of artistic growth, central to which was the importance of symbol use in general cognition and the artistic process, for the purpose of gaining new insights into aesthetic education (Lovano-Kerr & Rush, 1982). With the implementation of such research projects as ARTS PROPEL and Project Spectrum, among others, Project Zero has expanded its research interests into the educational arenas of curriculum and assessment.

Although results from the efforts of Project Zero are forthcoming, there is no doubt that the project has identified and confronted difficult questions. The potential of this theoretical base for illuminating some basic issues concerning artistic growth in children holds great promise (Lovano-Kerr & Rush, 1982).

Project Spectrum

Project Spectrum began in 1984 at Harvard and Tufts Universities as an attempt to reconceptualize the traditional linguistic and logical/mathematical bases of intelligence in young children (Krechevsky, 1991). The work at Project Spectrum has been directed toward the development and application of a more comprehensive and multi-faceted conception of intelligence (Feldman, Gardner, & Wexler-Sherman, 1988).

Feldman, Gardner, & Wexler-Sherman (1988) quote Caplan (1980) as stating that evidence depicting the extraordinary plasticity of the young mind suggests that the early years may be particularly fruitful ones for experiential enrichment and intervention. It is therefore important to document how diverse and distinct intelligences emerge and can be nurtured in very young children.

Project Spectrum is based on the assumption that every child has the potential to develop strength in one or several content areas and that it is the responsibility of the educational system to discover and nurture these proclivities (Krechevsky, 1991). It provides opportunities for and information on those talents and abilities that could serve children not only in school, but throughout life (Feldman, Gardner, & Wexler-Sherman, 1988).

Preliminary results suggest that the Spectrum system does indeed identify distinctive intellectual profiles in young children. It was also found that a child's strength in one area might facilitate performance in another. Follow-up data also indicated that strengths and working styles remained roughly constant one to two years later (Krechevesky, 1991).

ARTS PROPEL

ARTS PROPEL is a collaborative research project with the Educational Testing Service and the Pittsburgh Public School System that assesses middle and high school students' growth and achievement in artistic endeavors (Blythe & Gardner, 1990). This project was developed to find new ways of figuring out the strengths of students in the junior and senior high school in the arts and humanities (Gardner, 1987).

Students produce large-scale projects which are kept in portfolios and are assessed by the ARTS PROPEL researchers. Students are involved in the assessment process and are encouraged to reflect on completed projects.

It is too early to know how successful this effort will prove to be. However, it is not premature to indicate that researchers can learn a great deal from attempting to implement their ideas in a school setting (Gardner, 1989).

The Key School

The Key School, an elementary school in Indianapolis, was one of the first schools to implement the theory of multiple intelligences throughout an entire school. Its original aim was to use MI theory as a basis for a curriculum guide for gifted and talented

students. Educators at the school concluded that a wide range of students, from slow learners to gifted, could benefit by applying the seven areas of intelligence to the classroom. The school puts equal emphasis on all seven areas, and establishes a priority for a child by focusing on the student's area of strength. (Bolanos, 1994).

Faculty at the Key School developed a theme-based interdisciplinary curriculum for multi-aged classrooms. Student work is assessed through portfolios and projects which must meet exit-level performance standards.

In 1993, the Key Renaissance School, a middle school, was created as an extension of the Key School. The Renaissance School established mentorships in the community for its students to help prepare them to become future community leaders (Bolanos, 1994).

With the relative newness of the Key School and the Key Renaissance School, there has been little research published about the effects of implementing multiple intelligences into their curriculum. However, Bolanos (1994) stated that permission has been granted to build a high school, thus creating a total learning community based on the theory of multiple intelligences.

The New City School

The New City School in St. Louis, Missouri, adopted MI theory after its director, Thomas Hoerr, visited the Key School in Indianapolis. Hoerr (1994) decided that multiple intelligences could be a useful tool at the school and created a Talent Committee which began researching the theory of multiple intelligences.

Hoerr (1994) states that multiple intelligences is more than a theory of intelligence; it is, a philosophy about education with implications for how kids learn, how teachers should teach, and how schools should operate. Once MI theory had been implemented, the Talent Committee began studying student assessment, higher-level thinking skills, teaching for understanding, and parent communications as a way to further staff development.

In approaching the area of assessment, the Talent Committee discussed several options and created a multiple intelligences profile as one way to assess students. Table 1 shows an example of the profile used to assess students. Progress reports, portfolios, and a genuine understanding of subject matter are also ways in which students are assessed. The results of the profile and various assessments are shared with parents during conferences.

Table 1

Multiple Intelligences Profile

	Appreciates	Performs	Creates	Innovates	Limited Interest Observed
Bodily-Kinesthetic					
Interpersonal					
Intrapersonal					
Linguistic					
Logical-Mathematical					

Table 1 Cont.

Multiple Intelligences Profile

	Appreciates	Performs	Creates	Innovates	Limited Interest Observed
Musical					
Spatial					

As with the Key School, the New City School is relatively new, and little, if any, research has been reported on the effects of incorporating multiple intelligences into its curriculum.

The Expo School

The Excellence Elementary Magnet School (Expo) is an elementary school in Minnesota with MI theory as its philosophical foundation. The idea for the school was instigated by a member of the school board in 1990. The school now uses multiple intelligence theory along with a thematic curriculum and mixed-age classrooms as the basis for it educational practice.

Instructors at Expo go beyond the traditional educational approach, which usually emphasizes only language and math, and addresses all the identified seven intelligences. Learning is often project-based, and active learning is the norm (Expo, 1996).

Several methods of assessment are used at Expo, from goal-setting and portfolios to educator observations, student projects, presentations, and self-evaluation methods. Students do not get letter grades but a variation of the District's report card that incorporates the broadened perspective. Schools like Expo are becoming more common,

and one teacher has done some specific research with MI as a basis for theory and practice.

An Educator's Research

Bruce Campbell is a teacher at Cascade Elementary School in Maryville, Washington. During the 1989-1990 school year, Campbell participated in an action research project that explored student reactions to a multiple intelligences-based instructional model. Student behavior, attitudes, and abilities to work in non-traditional ways such as with music, movement, visual arts and cooperation were studied (Campbell, 1990).

Seven learning stations offered thematic multimodal learning activities engaging the seven intelligences. The subjects in the study were done with third through fifth graders. The curriculum reflected and was based on student interests (Campbell, 1992). Information was gathered through daily journal entries, classroom surveys, and student assessment inventories.

The following results were noted by Campbell (1992):

1) Students developed increased responsibility and independence during the year.

2) Students previously identified as having serious behavior problems showed rapid improvement during the first six weeks of school.

3) All students developed and applied new skills.

4) Cooperative learning skills improved in all students.

5) Academic achievement improved as measured by both classroom and

standardized tests.

Campbell also noted that as the school year progressed, new skills emerged, with several students discovering new-found abilities in such capacities as musical, artistic, literary, and mathematical. Campbell attributed the program's success to the fact that every student had an opportunity to specialize and excel in at least one area of human intelligence, and that many students' needs were met through the program.

Summary

The review of literature indicates that although schools have been developed which use MI theory, or are implementing multiple intelligences into existing curriculum, more research needs to be done as to the effects of their curriculum efforts. Whatever the fate of projects like Project Zero and others initiated by educators, MI theory has the potential to dramatically alter the ways in which we think and subsequently act in regard to schools and education (Blythe & Gardner, 1990).

CHAPTER III

Methodology and Procedures

Introduction

This study investigated student responses to the implementation of MI theory into the science and language arts curriculum. The study also examined the effect teaching about multiple intelligences had on student awareness of individual intelligence strengths.

Data were obtained through a series of audio-taped interviews, observation field notes, student surveys, and completed student portfolios and projects. A thematic science unit on ecology and the environment was integrated with the regular language arts curriculum. The concepts were presented using a variety of teaching methods, activities and projects designed to encompass Gardner's specified seven intelligences.

Overview

This chapter will explain the methodology used for this study. It will give a brief explanation of naturalistic inquiry and will include data gathering sources used for the research. The chapter will also include descriptions of a) design of the study, b) setting of the study, c) participants, d) procedures, and e) data analysis.

The research question

What effect does teaching with a multiple intelligence emphasis in an integrated science and language arts unit have on students' intelligence strengths?

The following questions served as a guide throughout the action research study:

1) What are participants' strengths in each of the seven intelligences?

2) How do student responses about personal intelligence strengths on the post-survey differ from those of the pre-survey?

a) What patterns develop in their responses?

3) How does teaching about the intelligences to participants affect their awareness of their individual strengths in each area?

a) How do students respond to questions about which intelligence they used during activities?

c) How do students incorporate intelligences when asked to create a project using seven intelligences?

Methodology

Qualitative research methods are designed to discover what can be learned about some phenomenon of interest, particularly social phenomena where people are the participants (Maykut and Morehouse, 1994). Qualitative researchers using naturalistic inquiry are interested in investigating questions that are non-controlling and have real world implications. They take an holistic perspective by looking at the whole person in a naturalistic setting (Grandgenett and Ostler, 1996.) Phenomenological perspectives aid in the understanding of participants from their point of view. Since events have different meanings for different people, it is important for researchers who use phenomenological perspective to try to comprehend individual perspectives.

Naturalistic inquiry is appropriate for this study because it focuses on students and their needs in an educational setting that exists without imposing new or unusual circumstances on those people evaluated (Lofland and Lofland, 1995). Naturalistic inquiries attempt to look at as much of the whole as possible with recognition of multiple realities, not just one objective reality. The research attempted to identify the different needs of each student which allowed the teacher to teach with those strengths as guide to each of the intelligences found naturally within each student. The study was designed to introduce seven different intelligences to students so that they would have an awareness of each of them within themselves.

Observations took place during the science and language arts periods in the researcher's sixth-grade classroom. The science thematic unit used for this study was integrated with the language arts curriculum and focused on ecology and the environment. Students participated in several activities and project results data were kept in ongoing individual portfolios. Data also included information gathered from student surveys, audio-taped interviews, and observational field notes.

Design of the Inquiry

A partial case-study design was chosen for this study. Three students from one sixth-grade class, in a self-contained classroom, participated in all aspects of the research.

Data from each of the three case-study students were collected and analyzed individually. Data were collected over a four-consecutive-week period which began in March. The three case-study students were observed on a daily basis for a continuous

period of time (up to ten minutes per activity). They were also informally interviewed weekly about their perceptions of the multiple intelligences and class activities. Interviews were audio-taped to make transcription more accurate. Descriptions of student project results and portfolios, compiled by the researcher, were included in the data to help identify student identified intelligences. Changes in students' perceptions of their less-developed intelligences were also noted.

Data obtained from case student surveys prior to the study were used to provide insight into the student's own understanding of his/her abilities. Since no test can accurately determine the nature or quality of a person's intelligences, Thomas Armstrong (1994) developed an inventory (see Appendix A) that allows individuals to "look back over the kinds of real-life experiences" they've already had in these seven intelligences. The survey is not a test and has no bearing on determining an individual's intelligence or lack of intelligence in each category (Armstrong, 1994).

The survey was conducted again at the end of the study. Data from the beginning and ending surveys were compiled and compared to identify any patterns which occurred in students' opinions of their learning about their multiple intelligence strengths and weaknesses. These data sources provided triangulation that directed conclusions of the study.

Procedures

Before introducing the students to the concept of MI, they were given a pre-survey to indicate their strengths in each of the seven intelligences. The survey used was taken

from the book Multiple Intelligences In The Classroom, by Thomas Armstrong (1994.) The survey has 10 items for each intelligence (see Appendix A). The items describe aspects or components of each intelligence. The students put a check by each item they felt characterized them. Items were not grouped by intelligence and an explanation of each item is provided in Appendix B. The researcher analyzed the surveys to note self-identified strengths and weaknesses in the seven intelligences.

Students were introduced to the concept of MI during their language arts curriculum. One week was devoted to instruction of MI theory. The teacher gave examples of each intelligence to explain the concept, using the students as examples to make the concept more real (e.g. Shana has a strong bodily/kinesthetic intelligence because she participates in several sports and takes dance and ballet classes, or Tyrell is a good speaker and writer and is strong in verbal/linguistic intelligence). Students were involved in discussions about MI and began to become cognitively aware of the different intelligences within themselves.

The MI study was integrated into a science and language arts thematic unit. Integrating the science and language arts curriculum allowed students to make connections between the subjects and thus make learning more meaningful. It also allowed students to pursue their own inquiries into the subject matter (Five & Dionisio, 1996).

The thematic unit was based on the subject of ecology and the environment and included activities and lessons that targeted the use of each of seven intelligences.

Examples of the different types of activities for involving each of the intelligences are provided in Table 2.

Table 2

MI LESSON PLAN: Ecology and the Environment

	Science	Reading	Writing
Linguistic	After learning about ecosystems (rainforest) discuss the following: deforestation; pollution; erosion; human influence/ interference; loss of habitat.	Read selected trade books to gather information on the rainforest. Read selected children's literature about the rainforest (i.e. The Great Kapok Tree)	Create an ABC book about the rainforest that contains information about the animals and plants that live there.
Logical/ Mathematical	Given the number of acres of rainforest lost each year to deforestation and human influence, calculate the number of acres lost per day.	Read a point/counterpoint article on the pro's &con's of cutting down rainforests. Have students decide for themselves where they stand on each issue.	After reading & discussing the pro's & con's of cutting down rainforests, students will write out their thoughts on each issue, taking into consideration all sides.
Spatial	Students will create a rain-forest on one wall of the classroom. They will label each of the 4 levels of the rainforest as well as the plants and animals found in each layer.	Look over several areal maps of burned rainforests to get a perspective of the amount of damage done. Read several trade books that label and identify the different layers of the rain- forest.	Students will label each plant and animal they create to put on the rainforest wall.

Table 2 Cont.

MI LESSON PLAN: Ecology and the Environment

	Science	Reading	Writing
Bodily/ Kinesthetic	Students will create a product out of some of the natural resources found in the rainforest.	Students will read how different animals move through the rain forest.	Students will write directions for a game that they will create based on the rainforest to be played with the rest of the class.
Musical	Students will discuss the sounds of the rainforest and come up with ways of re-producing those sounds. (i.e. making rain sticks)	Students will read about how rain sticks are formed and what they are used for.	Students will write a song or a poem to accompany the rain sticks they will make.
Interpersonal	Students will be broken into groups and be assigned one issue on the rain forest that they will have to defend in a mock trial setting.	Students will read about the different layers of the rain forest and the animals and plants found in each layer and then share their information with a small group.	In small groups, students will be assigned an issue concerning the rain forest and will come up with a written proposal as to how they plan on dealing with the issue.

Table 2 Cont.

MI LESSON PLAN: Ecology and the Environment

	Science	Reading	Writing
Intrapersonal	Students will research an endangered animal of their choice and write a report and create a paper mache mask of the animal.	Students will read about individuals and organizations that are working to save the rain forests.	Students will write letters to environmental organizations requesting information from them to find out more about what they can do for the environment.

Data were collected throughout the study with audio-taped informal interviews, observation field notes, and student work. Students kept portfolios of their work throughout the unit and were encouraged to journal their thoughts about MI. The journal entries were added to their portfolios. At the conclusion of the study, students took a post-survey to identify any changes in their perceived intelligence strengths.

Setting of the Inquiry

The School.

The school used for this study was an elementary public school located in a Midwestern city with a population of about 350,000. The school is the largest elementary school in the school district with just under 800 students in K-6 grades.

The multicultural make-up of the school is 57.8% Black American, 38.2% European American, 1.9% Hispanic, and 2.2% other. The students are not involved in

busing. The school is considered a neighborhood school.

The school provides many special services for students. Special education students' needs are met by a special education teacher who spends time with the students in the regular classroom as well as pulling students out of the classroom for one period each day for additional assistance. Challenge classes are offered in addition to the regular curriculum. Students are nominated for challenge classes by their teachers based upon their academic achievement, California Achievement Test scores, and motivation. Selected students from the nominated pool met once a week for one hour with the challenge teacher for a four week period.

The Classroom.

The sixth-grade students who participated in this study were the researcher's homeroom class. The class was housed in one of the portable classrooms. There were five sixth-grade classes located in the portable classrooms and all were departmentalized, with three of the classes working as a team and the remaining two classes forming their own team. The researcher's principal subject was science. Social studies and math were taught by the other two sixth-grade teachers on the team. Each teacher was responsible for teaching his/her homeroom class the regular language arts curriculum.

Talking was allowed during work time as long as it was kept at a minimum and was reflective of the activity or lesson at hand. To curb inappropriate talking, students were given the first ten minutes of each day to talk socially with one another. During individual assignments, students were encouraged to ask each other questions rather than

rely solely on the teacher. Many of the activities in the classroom involved cooperative learning groups and student directed learning. Thus, conversations about MI were a mere extension of typical practice.

Assignments and a student checklist were posted on the board on a daily basis. Students were responsible for completing assignments and then checking their name off the list to indicate that they had completed and turned in a particular assignment. An extra credit box was also available for students to turn in any extra credit work they completed on their own.

Discipline management in the classroom was standard among the sixth-grades in this particular school. Students were first given a verbal warning and then a written warning if the behavior continues. All written warnings were kept on the class clipboard which travels from classroom to classroom with the homeroom class. After five written warnings, the students are referred to the office. After three referrals, parents are contacted and the student suspended.

Participants

The Teacher.

In this study the classroom teacher was also the researcher. The researcher was a first-year teacher and was doing the research in conjunction with the requirements for a masters degree. The teacher encouraged students to help each other and allowed students to work together on assignments. Students were expected to follow the rules of the school and the classroom and to complete their assignments in a timely fashion.

During the beginning of the year, the teacher stressed the importance of respecting each other's opinions, beliefs, cultures, and experiences. This theme was repeatedly referred to in the classroom. In order to stress the importance of each individual, the teacher frequently shared her own experiences with the class. The teacher also strived to answer any appropriate student-initiated personal questions.

The teacher discussed the creation of a community of learners in the classroom early in the year. Students were asked what they thought it meant to be a part of a community of learners and how they would go about creating this type of environment in the classroom. Eventually students decided to come up with a class name, different from the school name, as well as create a class flag to identify themselves. Each student suggested names and contributed drawings for the flag. Students then voted on their favorite. After choosing a class name and flag, the students were challenged to come up with a class cheer. The class formed small groups and each came up with a cheer which they presented to the rest of the class. Again, the class voted. The group whose cheer was selected was then responsible for teaching the rest of the class their cheer. Each member of the selected group took part of the class and taught them the cheer. The students then practiced the cheer as a whole group. The students were excited about the cheer and enjoyed performing it as a group. The highlight for this activity was when the principal asked the class to present their cheer in front of the whole school during an assembly.

A second way the teacher created a community of learners was to introduce the

"Pride Wall". Students discussed what would be put on the wall and then divided the wall into equal sections and marked each square with tape so that each student had the same amount of space to display their work.

Class meetings were held once in every ten-day cycle in which students had the opportunity to voice their concerns about the classroom. A suggestion box was put in place in which students would anonymously write down their concerns or suggestions and put them in the box. The teacher facilitated the meetings by reiterating the rules about respecting other's views, comments, opinions, and suggestions. The teacher would read any suggestions or concerns from the suggestion box and the class as a whole would discuss them. This seemed to be very effective with the students since they were able to see that they had a voice in the room.

The Students.

There were twenty-one students in the classroom, twelve girls and nine boys. Nine of the girls are Black American, three are European American. Five of the boys are Black American, four are European American. The students' ages ranged from eleven to twelve years.

Three students were selected for case studies. Purposive sampling was used by the researcher in selecting subjects for the case study. This method of sampling was chosen to facilitate the expansion of the developing theory and to expand the variability of the sample (Biklen & Bogdan, 1982). The particular subjects selected were believed to be representative of the class.

The researcher used four criteria when selecting students for the case-study: a) the students selected were representative of the ethnic make-up of the class; b) the students were of similar academic standing with cumulative standardized CAT test scores within 10 points of each other; c) the students had different interactive strategies with their classmates; and d) the students had differing patterns of participation in class assignments.

The following descriptions provide a brief profile of each student highlighting selection criteria.

Emma

Emma is an European-American student. She was eleven-years old at the time of the study. Emma is an only child and lives with her parents. Both parents are employed. Emma appeared somewhat shy in class, but participated in class discussions when she seemed confident she knew the answer. She appeared uncomfortable presenting information in front of the class. She was pleasant and well-liked by the other students.

Emma appeared to enjoy school and always turned in assignments on time. She was an avid reader and writer, and many of her stories reflected the books she has read.

Dario

Dario was an eleven-year-old Black American at the time of the study. He is one of four children, and is the second youngest. He and his siblings live with their parents. Both parents work and are very supportive of their children and their education.

Dario had few friends in the classroom and appeared to direct his attention to one

or two boys in class. He usually remained silent during class discussions and participated little in small groups. Most of the time, Dario sat and stared at his desk or off into the distance. When reminded by the teacher to get to work, Dario appeared startled and then got annoyed. He needed several prompts or reminders to get back to work before he even started anything. When one of his friends was present in a small group situation, Dario tended to talk with his friend; however, the talk was not representative of the subject material.

Dario had problems early in the year with getting focused on his school work. After reviewing his cumulative folder, the researcher noted that this had been a problem in previous years. It was also noted that Dario had been tested for learning difficulties to see if he was eligible for special education classes. His scores were above average and did not qualify for special education. He had also had psychological testing done in the fourth grade, with no significant results.

Kenya

Kenya was an eleven-year-old Black American at the time of the study. She is one of several children who moved from mother's care to aunt's care.

Kenya was physically the smallest child in the class. Her personality seemed very rough and brash on the outside, but occasionally showed a softer inner side. She quickly pronounced judgement on others and verbalized her opinions of others. Kenya displayed an explosive temper which often got her in trouble.

Kenya scored high on achievement tests. Her grades did not reflect that ability.

She was satisfied with average grades and did not do more than was required. Kenya frequently turned in assignments late, or not at all. Her attitude towards her school work seemed to be one of indifference.

Kenya was a very passionate writer. Once she got started writing a story, she would write pages and pages. However, Kenya only wrote when she wanted to write. When the teacher discussed Kenya's stories with her, it was apparent from her responses that the stories often reflected her home life and other personal experiences. She was also one of the better writers in the class as she consistently wrote in a clear and organized fashion. Her thoughts were clearly represented and she was conscious of grammar and sentence structure.

Data Analysis

Data were analyzed by using a constant comparative method. The constant comparative method allowed the researcher to identify emerging themes or patterns in the data as it was being collected. Data were triangulated in order to understand phenomena from various points of view and further assist in identifying themes or patterns. Data from audio-taped interviews, observational field notes, and student documents were compared.

Summary

This chapter presented the primary research question for the study along with specific questions used to guide the research. The methodology used throughout the study was discussed and the design of the study was presented. The setting of the inquiry

described the location of the study as well as the participants. Detail was given to the case studies chosen for the research study. The procedure section outlined the study itself.

Chapter IV

Results

Introduction

This chapter reports the findings of this study. The data collected for this study included surveys, field observation notes, interviews, and student documents. The information was collected to determine the effect, if any, teaching with a multiple intelligence emphasis in an integrated science and language arts unit had on students' intelligence strengths.

The Case Students

The case students were selected on the basis of four criteria: a) they were representative of the ethnic make-up of the class; b) they were of similar academic standing with cumulative standardized CAT test scores within 10 points of each other; c) they had different interactive strategies with classmates; and d) they had differing patterns of participation in class assignments.

In order to make researcher involvement as clear as possible, from this point on I will write using first person. Students' names have been changed to provide for anonymity.

Pre-Survey and Post-Survey Results

In trying to identify participants' strengths in each of the seven intelligences prior to providing instruction about the intelligences, I administered a survey designed by Armstrong (1994) that allowed students to look back over the kinds of experiences

they've already had in the seven intelligences. Students selected items they felt they had participated in or had an interest in. After teaching about multiple intelligences, I administered the survey a second time (approximately four weeks after the pre-survey) in order to identify any differences in student responses from the pre-survey. The following are the results of the pre- and post-survey for each of the case students.

Kenya

Table 3

Kenya's Pre- and Post-Survey Results

Intelligence	Number of items selected (out of ten)	
	Pre-Survey	Post-Survey
Linguistic	6	6
Logical/ Mathematical	5	7
Spatial	5	6
Bodily/Kinesthetic	4	7
Musical	7	8
Interpersonal	6	8
Intrapersonal	4	6

In Chapter III, I described Kenya as one of the better writers in class. In looking at her perception of her linguistic intelligence from the pre-survey to the post-survey, there is no change in the amount of items marked. In fact, with the exception of one, Kenya marked the exact items on the pre-survey as she did on the post-survey. This indicates that she had a strong perception of her linguistic strengths prior to learning

about multiple intelligences. Indeed, in my observations of Kenya, I repeatedly noted that she was more on task when an activity involved writing. During one of my interviews with Kenya, I asked her which of the intelligences she felt were her strongest. One of her replies indicated a strength in linguistic intelligence when she replied, "I like to write and I like the project we are doing now where we write a novel about whatever we want, and I like writing on the computer."

The project which Kenya created using all the intelligences also depicted a strength in linguistic intelligence as the majority of the activities she created involved writing. Several examples included a creative writing piece about an animal in the rainforest, and in-depth instructions to the board game which she created with a partner. In fact, Kenya spent so much time on writing the instructions that I recommended that she keep them brief and to the point so that others could quickly figure out how to play when given the opportunity.

Kenya's spatial and musical intelligence had one more item checked on the post-survey than on the pre-survey. The items checked under spatial intelligence on the post-survey were exactly the same as those checked on the pre-survey with one addition. During one of our interviews, Kenya stated that she enjoyed a recent activity where students had to pretend they were a rain drop traveling through the water cycle and had to move around the room to different stations. Kenya's reply when I asked her what she specifically liked about the activity was, "I had to imagine I was a drop of water going through the water cycle. I made it all the way around the earth!"

The second part of the rain drop activity called for students to journal their "trip" as a rain drop. Rather than write about herself as a rain drop, I observed Kenya drawing out her journey as a rain drop. When I questioned her decision to draw instead of write, she replied that, "It was easier to see it on paper than to write about it," thus indicating strength in spatial intelligence.

Kenya's responses on the pre- and post-surveys for musical intelligence were also exactly identical with the addition of one more response on the post-survey. Kenya mentioned several times throughout her journal that she liked to sing or hum while she was working and was also a member of her church choir. What I found interesting, and interpreted as an increase in her perception of her musical intelligence, was that the additional response Kenya marked on the post-survey stated, "My life would be poorer if there were no music in it".

In response to the logical/mathematical portions of the surveys, Kenya again marked the same items on the post-survey as on the pre-survey, this time with the addition of two more items. When interviewed about the kinds of activities she enjoyed participating in during class time, she responded, "I like all the experiments we do and the (educational) games on the computer. I like the activities where we have to think about what we are going to do and then tell the class about it."

The latter activity Kenya mentioned involved students working in groups to come up with a solution as how to best utilize an area of forest that would take into consideration human and animal interests. Each group then had to present their proposals

to a group of judges made up of another group of students who would then discuss each proposal and decide which one they would choose to implement.

Several times during this activity, I observed Kenya firmly stating her opinions and why the group should use her ideas. At the end of the activity, Kenya came up to me and asked, "This was a fun activity, but next time, could I be one of the judges so I can decide who's idea should win?" Kenya also wrote in her journal about this activity, as well as several others, and mentioned that these activities were good because they were hard and made her think.

One area in which Kenya exhibited an increased awareness of her strengths was that of bodily/kinesthetic intelligence. It should be noted at this time that during the course of this study, Kenya began taking ballet and dance lessons. She never mentioned it in class, but did write about it in her journal. Another note of interest is that also during this time, some of the more athletic students began to realize that Kenya was also fairly athletic and began picking her to be on their basketball teams during recess.

Kenya's responses on the pre- and post-survey for bodily/kinesthetic intelligence were identical with three more responses marked on the post-survey. Two of the additional responses Kenya marked, "I would describe myself as well coordinated," and "I need to practice a new skill rather than simply read about it or see a video that describes it," clearly demonstrate an increased awareness in her bodily/kinesthetic intelligence.

Kenya's strength in intrapersonal intelligence was exhibited many times

throughout the study. She would frequently ask to do an activity by herself rather than with a group, or she would ask that her desk not be part of a foursome, but instead requested that it be moved by itself alongside one of the walls. Most of the time I accommodated her requests, but several times I chose not to because the activity at hand required cooperative group work. Kenya did not appear to have a problem participating in cooperative groups as long as the nature of the activity was explained to her and why it involved group work.

Kenya's intrapersonal intelligence was also clearly demonstrated through her journaling. First, she consistently journaled throughout the year, aside from the journaling required for this project. Second, she wrote freely in her journal about topics that she never discussed in class, such as her ballet and dance classes, as indicated in her post-survey response, "I have a special hobby or interest that I keep pretty much to myself." Finally, it seemed apparent that Kenya was internalizing the theory of MI as she frequently used the terminology in her journal writing to identify the areas she felt were her strengths. For example, Kenya wrote, "I am good at bodily intelligence because I am good in ballet class and I am a good basketball player," or "I am good at linguistic intelligence because I like to write stories." Her response on the post-survey, "I have a realistic view of my strengths and weaknesses," also shows an awareness of strength in intrapersonal intelligence.

Kenya's responses on the post-survey for interpersonal intelligence matched those of the pre-survey with the addition of two more items. Out of the intelligences,

interpersonal intelligence is the one intelligence in which I noticed a significant increase in strength in Kenya as indicated through field observation notes; for example, during an activity in which students made rain sticks with their partners, I wrote, "Kenya is very involved in the project. She is talking with her partner about the rain stick and how it should look. She mentioned musical intelligence to her partner while they were filling the rain stick with different types of materials. 'See, you can hear the different sounds these size seeds make compared to the larger ones. Let's mix them and try to make a really neat sound.'"

I noted many times that Kenya was not only willing to work with another student during the course of the study, but showed an increase in communication skills by talking to her partner about multiple intelligences in relation to the project or activity at hand.

Kenya seemed to grasp the theory of MI as demonstrated by the content of her journal writing and her responses to questions during interviews. Documentation of appropriate behavior and conversation relative to the study made during field observations as well as an increase in items marked on the post-survey from the pre-survey in each of the intelligences, also indicated an increased awareness in multiple intelligence strengths.

Emma

Table 4

Emma's Pre- and Post-Survey Results

Intelligence	Number of items selected (out of ten)	
	Pre-Survey	Post-Survey
Linguistic	4	7
Logical/ Mathematical	3	4
Spatial	5	8
Bodily/Kinesthetic	7	8
Musical	5	8
Interpersonal	5	6
Intrapersonal	6	7

The results of Emma's pre- and post-survey showed an increase in items marked on the post-survey for each of the intelligences, with a noticeable increase in post-survey items marked for linguistic intelligence, spatial intelligence, and musical intelligence.

Emma demonstrated a strong linguistic intelligence throughout the study. In my observational field notes, I noted several times that Emma would use her spare time to read or work on her novel. Her project included a number of written pieces as well as several poetry pieces. She would frequently ask for extra computer time to work on her novel and would even come in early before school for extra time on the computer. Emma's response on the post-survey, along with the types of activities she chose for her project, indicate an increased awareness in her linguistic intelligence.

Emma's increased responses on the post-survey for spatial intelligence are consistent with her comments during our interviews. When asked what types of activities she enjoyed participating in during class, she replied, "I like it when we do art projects. I like the board game we are making for our project. I like to paint and I like creating the rainforest on our wall." In response to a question about what activities students participated in during the spring break recess, Emma journaled that she, "Painted and drew the whole time." It is also interesting to note that when Emma turned in her journal, I noticed that she had drawn intricate designs all over the front cover.

While observing her make a paper-maché rain stick, I noted in my field notes that she seemed very cognizant of how the rain stick looked, often making comments such as, "we need to make it more bumpy looking so it looks like a real stick," or "we need to put darker paint on some parts to make it look like it's real." It was apparent that she had a clear picture in her mind of what she wanted to create.

The increase in items marked on the post-survey for musical intelligence was inconsistent with data gathered from Emma's journal, project, and interviews. Musical intelligence was not mentioned in her journaling, nor did it come up during our interviews. My observation field notes were also lacking in comments on Emma's musical intelligence. However, Emma and her partner did create a song about the environment for their project which they put in their portfolio. Since the other data did not show indications of self-perceived strengths in musical intelligence, the creation of the song may have been to satisfy the requirements of using all seven intelligences when

creating their project rather than an increased awareness of her musical intelligence.

Emma's logical/mathematical responses on the survey were the lowest of the intelligences, even though the post-survey showed an increase in items marked. Emma's perception of her lack of strength in this area was reflected during one of our interviews when I asked her which subjects she liked and disliked. She replied that math was her least favorite subject. For example, when asked why math was her least favorite subject, she replied, "I'm not very good at it. It's kind of hard." Her comments tended to indicate that she did not consider her logical/mathematical intelligence as one of her strengths.

In contrast, she mentioned that she enjoyed the activity in which groups of students had to work together to come up with a solution on what to do with a piece of forest land; an activity that required logical thinking. In my observational field notes on this particular activity however, I have noted that, "Emily appears interested in the discussion, but is not participating. She appears content just listening to what everyone else is saying." Therefore, I suggest that Emma may be interested in activities that involve the use of logic or math, but believes that logical/mathematical intelligence may not be her one of her strongest intelligences, and possibly does not feel comfortable openly participating in activities which require the use of that intelligence.

Emma marked most of the items on the pre- and post-survey for bodily/kinesthetic intelligence. This would tend to indicate a strength in bodily/kinesthetic intelligence prior to learning about multiple intelligences. Indeed, Emma's interests in the classroom prior to the start of the study were reflective of this strength. She enjoyed creating things with

her hands. For example she frequently made bracelets for her friends out of colored yarn.

Once MI was implemented in the science and language arts curriculum in the classroom, I noticed an increase in the number and types of focused projects using bodily-kinesthetic intelligence Emma created. For the board game that she and her partner worked on, Emma made all the game pieces out of clay.

The data from Emma's journal entries also supported an increased awareness of bodily/kinesthetic intelligence. She journaled that she enjoyed experiments that involved working with different types of materials, as well as making art projects and creating flowers and animals for the rainforest mural in the classroom.

Emma's responses to the personal intelligences showed an increase in the items marked on the post-survey for both intelligences. In looking first at Emma's interpersonal intelligence, the data would suggest that she did have an increased awareness of this intelligence within herself by the end of the study. For example, during several of our interviews, Emma commented that she enjoyed activities that required working with a partner or in groups. She also mentioned several times, as well as wrote about it in her journal, that she would like to be a teacher some day because she liked working with students and helping them learn.

My observational field notes of Emma throughout the study make mention of her apparent interpersonal intelligence strengths. I noted several times that Emma was on task and working effectively with her partner, talking about the activity or project on which they were working. I also noted several instances where it appeared that Emma

was more reserved. These instances usually involved larger groups. Indeed, Emma commented during one of our interviews that she was uncomfortable talking in front of larger groups and preferred smaller groups.

Emma's awareness in her intrapersonal intelligence also appeared to have increased during the course of the study. During her free time, rather than talk quietly with a friend Emma would often take out a book to read or write in her journal. She would also ask to play one of the educational games on the computer.

Data from Emma's journal entries also indicate an increased awareness in intrapersonal intelligence. An only child, Emma writes, "I'm glad I'm an only child because I like to have my own room so that I can read and not be bothered." Another entry stated, "I like to work with a partner in class, but I like to work alone too. Sometimes I like it even better because then I don't have to always share my ideas and can keep them to myself."

Data collected on Emma during the course of the study indicated an increased awareness of intelligence strengths overall. Aside from the inconsistent results for musical intelligence, it appears that teaching the multiple intelligences in the classroom increased Emma's awareness of her intelligence strengths. This also includes an awareness of the logical/mathematical intelligence within herself, but not necessarily as a strength.

Dario

Table 5

Dario's Pre- and Post-Survey Results

Intelligences	Number of items selected (out of ten)	
	Pre-Survey	Post-Survey
Linguistic	4	7
Logical/ Mathematical	4	3
Spatial	2	5
Bodily/Kinesthetic	4	5
Musical	3	2
Interpersonal	4	9
Intrapersonal	4	3

The data collected on Dario during the course of the study were very inconsistent. During my interviews with Dario, his answers to my specific questions about his intelligence strengths were, "I dunno," or "I think I'm good at spatial," but he could not tell my why or how. I also noted extreme inconsistencies between the pre- and post-survey results when compared to his journal entries as well as my observational field notes.

One example of an inconsistency was his interpersonal intelligence. Dario marked 4 items on the pre-survey and 9 items on the post-survey. I found no indication in any of his journal entries that would support an increased awareness of his interpersonal intelligence as a strength. In fact, during my observations of him in class, in all but one

instance, I noted that, "Dario is not talking," or "Dario is not participating in the group activity," or "Dario is watching his partner do all the work." At one point, when Dario's partner was working on their board game, I asked Dario how he was participating in the activity. He responded, "I'm thinking about questions for the game." At the completion of their game, there were no cards with questions on them. In fact, Dario's partner wrote out the instructions for the game and it was identified in the instructions that the purpose of the game was to solve mathematical problems in order to move ahead to the next space. The one instance in which I observed Dario talking, he was completely off task.

To add to the inconsistency, Dario's last journal entry was about what he liked and disliked about the project using multiple intelligences. He wrote that he liked, "being able to create a board game." He then wrote that he disliked the fact that his, "partner did all the work and wouldn't let (me) do anything."

It was difficult to identify any increased awareness of intelligence strengths for a number of reasons. First, Dario was very disorganized. Throughout the study, Dario was consistently missing assignments, or turning them in late. He frequently was without a pen or pencil because he could not find them or remember where he left them. Dario's desk was constantly disorganized. During one expedition into his desk, I discovered eight missing assignments from previous weeks.

Second, Dario was easily distracted. He was rarely on task, and needed frequent reminders to continue with his work. Dario seemed to have a difficult time with the multiple intelligence project. This could have been a result of the increased freedom in

deciding what projects to do.

When I noted early on in the study that Dario was having difficulty staying on task and completing assignments, I sat down with him to create an outline of what he wanted to do for his project. I discovered while writing the outline with Dario that he loved computers. He mentioned that he played Nintendo for at least four hours every night. I tried to use this interest in computers as a way to get Dario focused on his project. I suggested possible topics to write on, using the computer. Initially Dario seemed to like the idea of using the computer for the project. Unfortunately, he was easily distracted while he was on the computer as well. If someone was using the computer next to him, he was more interested in what they were doing than he was in his own work. What seemed ironic was the fact that he repeatedly asked if he could work on the computer.

A third factor which may have added to the inconsistencies in the data was Dario's apparent lack of motivation in the classroom. Whether this was due to immaturity or a lack of interest in the material, Dario's motivation in the classroom was clearly lacking as was evident in his inability to get assignments completed or turned in -- even if he was allowed to use the computer, which he claimed to enjoy using.

The only intelligence that showed the possibility of a pattern was bodily/kinesthetic intelligence. Dario noted in his journal that he liked to participate in sports. He also mentioned sports during two of the interviews we had. The pre- and post-survey showed an increase in the number of items marked however, when I compared the items, all but one was different.

In summation, this study produced mixed results in response to the research question. Teaching with a multiple intelligence emphasis in an integrated science and language arts unit did affect two of the case study's perceptions of their intelligence strengths. Both Kenya's and Emma's results showed an increased awareness in self-identified intelligences. Dario's results however, failed to show any increase in awareness of intelligence strengths nor an understanding of the concept of multiple intelligences.

Chapter V

Discussion

Summary

The primary objective of this research was to identify the effect of teaching with a multiple intelligence emphasis in an integrated science and language arts unit on students' intelligence strengths. Secondary questions looked to identify any patterns in student responses, as well as noting any increased awareness, in student-identified intelligence strengths.

Triangulation of data allowed for a noticeable pattern in Kenya's data results. Her responses on the pre- and post-survey indicated an increased awareness of intelligence strengths and were supported by data from her journal entries as well as her responses during interviews with the researcher. Observational field notes provided further evidence that Kenya was aware of her intelligence strengths as indicated in the types of activities she chose to include in her project using multiple intelligences.

Although there were inconsistencies in the identification of strengths in musical intelligence, an overall pattern was discernable in Emma's data results, primarily in the comparison of observational field notes, interviews, and journal entries. The activities Emma selected for her project further served to show increased awareness of intelligence strengths.

The research results from Dario's data proved inconclusive as to whether or not Dario attained an increased awareness of his intelligence strengths. A number of factors

could possibly have contributed to the inconsistencies in Dario's data, such as his lack of organizational skills, possible lack of motivation and immaturity, or his inability to stay on task. Another possibility may be a result of the teacher's inability to find the right motivational tool for Dario, or the length of the time of the study to try different instructional techniques.

One major limitation of this study, as mentioned above, was the length of the study. In reviewing the literature on Harvard's Project Zero and its various research projects, it appears that research on teaching with multiple intelligences in the classroom needs to be done over a sustained period of time in order to fully realize the effects it has on students, as is indicated by the lack of such research results.

Based on Kenya's and Emma's responses, the results of this study show potential for the incorporation of multiple intelligences in the classroom as demonstrated by their increased awareness of their intelligence strengths. A more conclusive study, incorporated over a greater period of time such as the study done by Campbell (1992), would most likely produce more noticeable patterns in data among the case students.

Based on Campbell's (1992) results and the results of this study, teachers can find support for including multiple intelligences into their curriculum and should be encouraged to use MI theory as a way of broadening their pedagogical philosophy.

Recommendations for Further Research

The inconsistent results of Dario's data led the researcher to look closer at motivational factors affecting student productivity. In his book, Emotional Intelligence,

Goleman (1995) discusses a different way of being smart-- "emotional intelligence." In the book, he addresses the possibility of an emotional intelligence and how it can hinder people of high IQ and help those with lower IQ's. It is recommended that future research on multiple intelligences be conducted in conjunction with emotional intelligence.

In response to Dario's interest in computers, it is also recommended that research be conducted on the use of computers in the multiple intelligence classroom. Several topics could be addressed under this title. First, do computers in the classroom provide a motivational boost to students identified as lacking in motivation? Second, when computers are used in the classroom, how much time is actually productive, "on-task" time? Lastly, how do computers serve as a tool for instructors who incorporate multiple intelligence theory in their classroom?

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Appendix A

Pre- and Post-Survey

Check those statements that apply to you. There are no wrong or right answers. Just give your first reaction.

_____ Books are very important to me.

_____ I can easily compute numbers in my head.

_____ I often see clear visual images when I close my eyes.

_____ I engage in at least one sport or physical activity on a regular basis.

_____ I have a pleasant singing voice.

_____ I'm the sort of person that people come to for advice and counsel at work or in my neighborhood.

_____ I regularly spend time alone meditating, reflecting, or thinking about important life questions.

_____ I can hear words in my head before I read, speak, or write them down.

_____ Math and/or science were among my favorite subjects in school.

_____ I'm sensitive to color.

_____ I find it difficult to sit still for long periods of time.

_____ I can tell when a musical note is off-key.

_____ I prefer group sports like badminton, volleyball, or softball to solo sports such as swimming and jogging.

_____ I have attended counseling sessions or personal growth seminars to learn more about myself.

_____ I get more out of listening to the radio or a spoken-word cassette than I do from television or films.

_____ I enjoy playing games or solving brain teasers that require logical thinking.

_____ I frequently use a camera or camcorder to record what I see around me.

_____ I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building.

_____ I frequently listen to music on radio, records, cassettes, or compact discs.

_____ When I have a problem, I'm more likely to seek out another person for help than attempt to work it out on my own.

_____ I am able to respond to setbacks with resilience.

_____ I enjoy word games like Scrabble, Anagrams, or Password.

_____ I like to set up little "what if" experiments (for example, "What if I double the amount of water I give to my rosebush each week?")

_____ I enjoy doing jigsaw puzzles, mazes, and other visual puzzles.

_____ My best ideas often come to me when I'm out for a long walk or a jog, or when I'm engaging in some other kind of physical activity.

_____ I play a musical instrument.

_____ I have at least three close friends.

_____ I have a special hobby or interest that I keep pretty much to myself.

_____ I enjoy entertaining myself or others with tongue twisters, nonsense

rhymes, or puns.

_____ My mind searches for patterns, regularities, or logical sequences in things.

_____ I have vivid dreams at night.

_____ I often like to spend my free time outdoors.

_____ My life would be poorer if there were no music in it.

_____ I favor social pastimes such as Monopoly or bridge over individual recreations such as video games and solitaire.

_____ I have some important goals for my life that I think about on a regular basis.

_____ Other people sometimes have to stop and ask me to explain the meaning of the words I use in my writing and speaking.

_____ I'm interested in new developments in science.

_____ I can generally find my way around unfamiliar territory.

_____ I frequently use hand gestures or other forms of body language when conversing with someone.

_____ I sometimes catch myself walking down the street with a television jingle or other tune running through my mind.

_____ I enjoy the challenge of teaching another person, or groups of people, what I know how to do.

_____ I have a realistic view of my strengths and weaknesses (borne out by feedback from other sources).

_____ English, social studies, and history were easier for me in school than math and science.

_____ I believe that almost everything has a rational explanation.

_____ I like to draw or doodle.

_____ I need to touch things in order to learn more about them.

_____ I can easily keep time to a piece of music with a simple percussion instrument.

_____ I consider myself a leader (or others have called me that).

_____ I would prefer to spend a weekend alone in a cabin in the woods rather than at a fancy resort with lots of people around.

_____ When I drive down a freeway, I pay more attention to the words written on billboards than to the scenery.

_____ I sometimes think in clear, abstract, wordless, imageless concepts.

_____ Geometry was easier for me than algebra in school.

_____ I enjoy daredevil amusement rides or similar thrilling physical experiences.

_____ I know the tunes to many different songs or musical pieces.

_____ I feel comfortable in the midst of a crowd.

_____ I consider myself to be strong willed or independent minded.

_____ My conversation includes frequent references to things that I've read or heard.

_____ I like finding logical flaws in things that people say and do at home

and work.

_____I can comfortably imagine how something might appear if it were looked down upon from directly above in a bird's-eye view.

_____ I would describe myself as well coordinated.

_____ If I hear a musical selection once or twice, I am usually able to sing it back fairly accurately.

_____ I like to get involved in social activities connected with my work, church, or community.

_____ I keep a personal diary or journal to record the events of my inner life.

_____ I've written something recently that I was particularly proud of or that earned me recognition from others.

_____ I feel more comfortable when something has been measured, categorized, analyzed, or quantified in some way.

_____ I prefer looking at reading material that is heavily illustrated.

_____ I need to practice a new skill rather than simply read about it or see a video that describes it.

_____ I often make tapping sounds or sing little melodies while working, studying, or learning something new.

_____ I would rather spend my evenings at a lively party than stay at home alone.

_____ I am self-employed or have at least thought seriously about starting my own business.

Appendix B

Explanation of Pre- and Post-Survey Items

Key: L = Linguistic Intelligence
LM = Logical/Mathematical Intelligence
S = Spatial Intelligence
BK = Bodily/Kinesthetic Intelligence
M = Musical Intelligence
IE = Interpersonal Intelligence
IA = Intrapersonal Intelligence

_____ Books are very important to me. (L)

_____ I can easily compute numbers in my head. (LM)

_____ I often see clear visual images when I close my eyes. (S)

_____ I engage in at least one sport or physical activity on a regular basis. (BK)

_____ I have a pleasant singing voice. (M)

_____ I'm the sort of person that people come to for advice and counsel at work or in my neighborhood. (IE)

_____ I regularly spend time alone meditating, reflecting, or thinking about important life questions. (IA)

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_____ Math and/or science were among my favorite subjects in school. (LM)

_____ I'm sensitive to color. (S)

_____ I find it difficult to sit still for long periods of time. (BK)

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_____ I prefer group sports like badminton, volleyball, or softball to solo sports such as swimming and jogging. (IE)

_____ I have attended counseling sessions or personal growth seminars to learn more about myself. (IA)

_____ I get more out of listening to the radio or a spoken-word cassette than I do from television or films. (L)

_____ I enjoy playing games or solving brain teasers that require logical thinking. (LM)

_____ I frequently use a camera or camcorder to record what I see around me. (S)

_____ I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building. (BK)

_____ I frequently listen to music on radio, records, cassettes, or compact discs. (M)

_____ When I have a problem, I'm more likely to seek out another person for help than attempt to work it out on my own. (IE)

_____ I am able to respond to setbacks with resilience. (IA)

_____ I enjoy word games like Scrabble, Anagrams, or Password. (L)

_____ I like to set up little "what if" experiments (for example, "What if I double the amount of water I give to my rosebush each week?"). (LM)

_____ I enjoy doing jigsaw puzzles, mazes, and other visual puzzles. (S)

_____ My best ideas often come to me when I'm out for a long walk or a jog, or when I'm engaging in some other kind of physical activity. (BK)

_____ I play a musical instrument. (M)

_____ I have at least three close friends. (IE)

_____ I have a special hobby or interest that I keep pretty much to myself. (IA)

_____ I enjoy entertaining myself or others with tongue twisters, nonsense rhymes, or puns. (L)

_____ My mind searches for patterns, regularities, or logical sequences in things. (LM)

_____ I have vivid dreams at night. (S)

_____ I often like to spend my free time outdoors. (BK)

_____ My life would be poorer if there were no music in it. (M)

_____ I favor social pastimes such as Monopoly or bridge over individual recreations such as video games and solitaire. (IE)

_____ I have some important goals for my life that I think about on a regular basis. (IA)

_____ Other people sometimes have to stop and ask me to explain the meaning of the words I use in my writing and speaking. (L)

_____ I'm interested in new developments in science. (LM)

_____ I can generally find my way around unfamiliar territory. (S)

_____ I frequently use hand gestures or other forms of body language when conversing with someone. (BK)

_____ I sometimes catch myself walking down the street with a television jingle or other tune running through my mind. (M)

_____ I enjoy the challenge of teaching another person, or groups of people, what I know how to do. (IE)

_____ I have a realistic view of my strengths and weaknesses (borne out by feedback from other sources). (IA)

_____ English, social studies, and history were easier for me in school than math and science. (L)

_____ I believe that almost everything has a rational explanation. (LM)

_____ I like to draw or doodle. (S)

_____ I need to touch things in order to learn more about them. (BK)

_____ I can easily keep time to a piece of music with a simple percussion instrument. (M)

_____ I consider myself a leader (or others have called me that). (IE)

_____ I would prefer to spend a weekend alone in a cabin in the woods rather than at a fancy resort with lots of people around. (IA)

_____ When I drive down a freeway, I pay more attention to the words written on billboards than to the scenery. (L)

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_____ I like finding logical flaws in things that people say and do at home and work. (LM)

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_____ I would rather spend my evenings at a lively party than stay at home alone. (IE)

_____ I am self-employed or have at least thought seriously about starting my own business. (IA)

instance, I noted that, "Dario is not talking," or "Dario is not participating in the group activity," or "Dario is watching his partner do all the work." At one point, when Dario's partner was working on their board game, I asked Dario how he was participating in the activity. He responded, "I'm thinking about questions for the game." At the completion of their game, there were no cards with questions on them. In fact, Dario's partner wrote out the instructions for the game and it was identified in the instructions that the purpose of the game was to solve mathematical problems in order to move ahead to the next space. The one instance in which I observed Dario talking, he was completely off task.

To add to the inconsistency, Dario's last journal entry was about what he liked and disliked about the project using multiple intelligences. He wrote that he liked, "being able to create a board game." He then wrote that he disliked the fact that his, "partner did all the work and wouldn't let (me) do anything."

It was difficult to identify any increased awareness of intelligence strengths for a number of reasons. First, Dario was very disorganized. Throughout the study, Dario was consistently missing assignments, or turning them in late. He frequently was without a pen or pencil because he could not find them or remember where he left them. Dario's desk was constantly disorganized. During one expedition into his desk, I discovered eight missing assignments from previous weeks.

Second, Dario was easily distracted. He was rarely on task, and needed frequent reminders to continue with his work. Dario seemed to have a difficult time with the multiple intelligence project. This could have been a result of the increased freedom in

deciding what projects to do.

When I noted early on in the study that Dario was having difficulty staying on task and completing assignments, I sat down with him to create an outline of what he wanted to do for his project. I discovered while writing the outline with Dario that he loved computers. He mentioned that he played Nintendo for at least four hours every night. I tried to use this interest in computers as a way to get Dario focused on his project. I suggested possible topics to write on, using the computer. Initially Dario seemed to like the idea of using the computer for the project. Unfortunately, he was easily distracted while he was on the computer as well. If someone was using the computer next to him, he was more interested in what they were doing than he was in his own work. What seemed ironic was the fact that he repeatedly asked if he could work on the computer.

A third factor which may have added to the inconsistencies in the data was Dario's apparent lack of motivation in the classroom. Whether this was due to immaturity or a lack of interest in the material, Dario's motivation in the classroom was clearly lacking as was evident in his inability to get assignments completed or turned in -- even if he was allowed to use the computer, which he claimed to enjoy using.

The only intelligence that showed the possibility of a pattern was bodily/kinesthetic intelligence. Dario noted in his journal that he liked to participate in sports. He also mentioned sports during two of the interviews we had. The pre- and post-survey showed an increase in the number of items marked however, when I compared the items, all but one was different.

In summation, this study produced mixed results in response to the research question. Teaching with a multiple intelligence emphasis in an integrated science and language arts unit did affect two of the case study's perceptions of their intelligence strengths. Both Kenya's and Emma's results showed an increased awareness in self-identified intelligences. Dario's results however, failed to show any increase in awareness of intelligence strengths nor an understanding of the concept of multiple intelligences.

Chapter V

Discussion

Summary

The primary objective of this research was to identify the effect of teaching with a multiple intelligence emphasis in an integrated science and language arts unit on students' intelligence strengths. Secondary questions looked to identify any patterns in student responses, as well as noting any increased awareness, in student-identified intelligence strengths.

Triangulation of data allowed for a noticeable pattern in Kenya's data results. Her responses on the pre- and post-survey indicated an increased awareness of intelligence strengths and were supported by data from her journal entries as well as her responses during interviews with the researcher. Observational field notes provided further evidence that Kenya was aware of her intelligence strengths as indicated in the types of activities she chose to include in her project using multiple intelligences.

Although there were inconsistencies in the identification of strengths in musical intelligence, an overall pattern was discernable in Emma's data results, primarily in the comparison of observational field notes, interviews, and journal entries. The activities Emma selected for her project further served to show increased awareness of intelligence strengths.

The research results from Dario's data proved inconclusive as to whether or not Dario attained an increased awareness of his intelligence strengths. A number of factors

could possibly have contributed to the inconsistencies in Dario's data, such as his lack of organizational skills, possible lack of motivation and immaturity, or his inability to stay on task. Another possibility may be a result of the teacher's inability to find the right motivational tool for Dario, or the length of the time of the study to try different instructional techniques.

One major limitation of this study, as mentioned above, was the length of the study. In reviewing the literature on Harvard's Project Zero and its various research projects, it appears that research on teaching with multiple intelligences in the classroom needs to be done over a sustained period of time in order to fully realize the effects it has on students, as is indicated by the lack of such research results.

Based on Kenya's and Emma's responses, the results of this study show potential for the incorporation of multiple intelligences in the classroom as demonstrated by their increased awareness of their intelligence strengths. A more conclusive study, incorporated over a greater period of time such as the study done by Campbell (1992), would most likely produce more noticeable patterns in data among the case students.

Based on Campbell's (1992) results and the results of this study, teachers can find support for including multiple intelligences into their curriculum and should be encouraged to use MI theory as a way of broadening their pedagogical philosophy.

Recommendations for Further Research

The inconsistent results of Dario's data led the researcher to look closer at motivational factors affecting student productivity. In his book, Emotional Intelligence,

Goleman (1995) discusses a different way of being smart-- "emotional intelligence." In the book, he addresses the possibility of an emotional intelligence and how it can hinder people of high IQ and help those with lower IQ's. It is recommended that future research on multiple intelligences be conducted in conjunction with emotional intelligence.

In response to Dario's interest in computers, it is also recommended that research be conducted on the use of computers in the multiple intelligence classroom. Several topics could be addressed under this title. First, do computers in the classroom provide a motivational boost to students identified as lacking in motivation? Second, when computers are used in the classroom, how much time is actually productive, "on-task" time? Lastly, how do computers serve as a tool for instructors who incorporate multiple intelligence theory in their classroom?

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Appendix A

Pre- and Post-Survey

Check those statements that apply to you. There are no wrong or right answers. Just give your first reaction.

_____ Books are very important to me.

_____ I can easily compute numbers in my head.

_____ I often see clear visual images when I close my eyes.

_____ I engage in at least one sport or physical activity on a regular basis.

_____ I have a pleasant singing voice.

_____ I'm the sort of person that people come to for advice and counsel at work or in my neighborhood.

_____ I regularly spend time alone meditating, reflecting, or thinking about important life questions.

_____ I can hear words in my head before I read, speak, or write them down.

_____ Math and/or science were among my favorite subjects in school.

_____ I'm sensitive to color.

_____ I find it difficult to sit still for long periods of time.

_____ I can tell when a musical note is off-key.

_____ I prefer group sports like badminton, volleyball, or softball to solo sports such as swimming and jogging.

_____ I have attended counseling sessions or personal growth seminars to learn more about myself.

_____ I get more out of listening to the radio or a spoken-word cassette than I do from television or films.

_____ I enjoy playing games or solving brain teasers that require logical thinking.

_____ I frequently use a camera or camcorder to record what I see around me.

_____ I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building.

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_____ I like to set up little "what if" experiments (for example, "What if I double the amount of water I give to my rosebush each week?")

_____ I enjoy doing jigsaw puzzles, mazes, and other visual puzzles.

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_____ I have at least three close friends.

_____ I have a special hobby or interest that I keep pretty much to myself.

_____ I enjoy entertaining myself or others with tongue twisters, nonsense

rhymes, or puns.

_____ My mind searches for patterns, regularities, or logical sequences in things.

_____ I have vivid dreams at night.

_____ I often like to spend my free time outdoors.

_____ My life would be poorer if there were no music in it.

_____ I favor social pastimes such as Monopoly or bridge over individual recreations such as video games and solitaire.

_____ I have some important goals for my life that I think about on a regular basis.

_____ Other people sometimes have to stop and ask me to explain the meaning of the words I use in my writing and speaking.

_____ I'm interested in new developments in science.

_____ I can generally find my way around unfamiliar territory.

_____ I frequently use hand gestures or other forms of body language when conversing with someone.

_____ I sometimes catch myself walking down the street with a television jingle or other tune running through my mind.

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_____ I have a realistic view of my strengths and weaknesses (borne out by feedback from other sources).

_____ English, social studies, and history were easier for me in school than math and science.

_____ I believe that almost everything has a rational explanation.

_____ I like to draw or doodle.

_____ I need to touch things in order to learn more about them.

_____ I can easily keep time to a piece of music with a simple percussion instrument.

_____ I consider myself a leader (or others have called me that).

_____ I would prefer to spend a weekend alone in a cabin in the woods rather than at a fancy resort with lots of people around.

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_____ I need to practice a new skill rather than simply read about it or see a video that describes it.

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_____ I am self-employed or have at least thought seriously about starting my own business.

Appendix B

Explanation of Pre- and Post-Survey Items

Key: L = Linguistic Intelligence
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M = Musical Intelligence
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_____ I regularly spend time alone meditating, reflecting, or thinking about important life questions. (IA)

_____ I can hear words in my head before I read, speak, or write them down. (L)

_____ Math and/or science were among my favorite subjects in school. (LM)

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_____ I find it difficult to sit still for long periods of time. (BK)

_____ I can tell when a musical note is off-key. (M)

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_____ I frequently use a camera or camcorder to record what I see around me. (S)

_____ I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building. (BK)

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_____ I enjoy doing jigsaw puzzles, mazes, and other visual puzzles. (S)

_____ My best ideas often come to me when I'm out for a long walk or a jog, or when I'm engaging in some other kind of physical activity. (BK)

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_____ I need to touch things in order to learn more about them. (BK)

_____ I can easily keep time to a piece of music with a simple percussion instrument. (M)

_____ I consider myself a leader (or others have called me that). (IE)

_____ I would prefer to spend a weekend alone in a cabin in the woods rather than at a fancy resort with lots of people around. (IA)

_____ When I drive down a freeway, I pay more attention to the words written on billboards than to the scenery. (L)

_____ I sometimes think in clear, abstract, wordless, imageless concepts. (LM)

_____ Geometry was easier for me than algebra in school. (S)

_____ I enjoy daredevil amusement rides or similar thrilling physical experiences. (BK)

_____ I know the tunes to many different songs or musical pieces. (M)

_____ I feel comfortable in the midst of a crowd. (IE)

_____ I consider myself to be strong willed or independent minded. (IA)

_____ My conversation includes frequent references to things that I've read or heard. (L)

_____ I like finding logical flaws in things that people say and do at home and work. (LM)

_____ I can comfortably imagine how something might appear if it were looked down upon from directly above in a bird's-eye view. (S)

_____ I would describe myself as well coordinated. (BK)

_____ If I hear a musical selection once or twice, I am usually able to sing it back fairly accurately. (M)

_____ I like to get involved in social activities connected with my work, church, or community. (IE)

_____ I keep a personal diary or journal to record the events of my inner life. (IA)

_____ I've written something recently that I was particularly proud of or that earned me recognition from others. (L)

_____ I feel more comfortable when something has been measured, categorized, analyzed, or quantified in some way. (LM)

_____ I prefer looking at reading material that is heavily illustrated. (S)

_____ I need to practice a new skill rather than simply read about it or see a video that describes it. (BK)

_____ I often make tapping sounds or sing little melodies while working, studying, or learning something new. (M)

_____ I would rather spend my evenings at a lively party than stay at home alone. (IE)

_____ I am self-employed or have at least thought seriously about starting my own business. (IA)